THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science

Established 1875.

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VOLUME CII.

LONDON:
BAILLIÈRE, TINDALL & COX,
7 & 8, HENRIETTA STREET, COVENT GARDEN, W.C.

1946

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JANUARY, 1946.

EDITORIAL

ARTIFICIAL INSEMINATION

Our readers will have seen that the Agricultural (Artificial Insemination) Bill, which applies to England and Wales and to Scotland, had its second reading in the House of Commons on November 14. The Bill provides, among other things, for the setting up of artificial insemination centres for research purposes and the underwriting of approved losses incurred by artificial insemination centres in any accounting year for a period of five years, from January 1, 1945, to March 31, 1950.

While this method of breeding has been practised in different parts of the world on a small scale for centuries it is only within recent times that the techniques now in use have been devised and which have made the operation applicable to a greater extent. Some European countries have been practising artificial insemination during the past few years: thus, in 1936, the Russians reported that 60,000,000 cattle and sheep were bred artificially, and in 1936-37 it is reported that in Denmark 900 cows were bred artificially with the semen of one bull. In this country there are now eight or nine Artificial Insemination Centres and plans are made to increase the number during the next few years.

Artificial insemination can accomplish two important objects—the improvement of the quality of livestock from the production point of view, e.g., milk and meat and the control of disease transmissible by natural mating. To ensure the first of these objectives the quality and history of the bulls used at Centres is important: in order that satisfactory results will be produced the bull or his forbears must be shown to be capable of transmitting the desired qualities, e.g., milk yields and butter fat content of milk. In selecting bulls for use at Centres in this country much attention is given to the performance of the individual bull if he be old enough to judge by that means, or, if young, to the performance of his near relations.

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Bulls used at Centres must be of sound health and free from communicable diseases. The tests applied, before a bull is finally selected, are searching and include those devised to ensure freedom from tuberculosis, brucellosis and the various venereal infections : of the latter, trichomoniasis receives special attention. Although we have not yet at our command a single reliable test for the diagnosis of trichomoniasis the presence or absence of the infection can be judged by the breeding history of the herd in which the bull is located, clinical examinations of the cows and heifers in the herd and clinical examinations, including microscopical tests, of the genital organs of the bull.

It is essential, also, to examine the service behaviour and the fertility of the bulls. Tests applied to semen (e.g., volume, density, motility and keeping properties) are of much assistance in assessing the future value of a bull for artificial insemination purposes.

More research work, both of a fundamental and an applied character, is yet to be carried out before we can proceed much further with the practice of artificial insemination. For this work provision is made in the Bill : much of it, especially on the applied side, must be concerned with Centres from which considerable amounts of semen are distributed. The observations on large numbers of treated cows and heifers are important.

While we should soon have provision for the study of fertility and infertility in the bull we must not forget that the begetting of satisfactory offspring also depends to a very considerable extent on the health and breeding capability of the female. Steps must be taken to include in our work the study of fertility and infertility in cows and heifers. Although the results of artificial insemination in most areas show that 50 to 60 per cent. or over of first inseminations are followed by satisfactory conception and that over 90 per cent. successful results are obtained from three inseminations, there is still a high incidence of infertility in some parts of the country. Artificial insemination is helping us to obtain a clearer picture of the true incidence of infertility and some of its causes. We must, however, continue to pay attention to, and increase the research work, on the fundamental causes.

THE NEW YEAR—1946

WHEN this issue of the *Veterinary Journal* reaches our readers a new year will have dawned. The year 1946 will bring with it new resolutions, and one will certainly be that we will grasp the opportunities now presented to improve the well-being of the nation. We, members of the Veterinary Profession, have a big part to play in this effort, for to us falls the duty of maintaining the health of the country's livestock, upon which much of the life of the nation depends. Overworked as many of us have been during the past few years, and still are, we go forward into 1946 with the full determination to continue to the best of our ability and to play our part in the nation's life. There is much for us to do : we will not hesitate to continue the important work allotted to us.

With these thoughts in mind we extend to all our readers every good wish for the coming year.

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General Articles

FOWL PLAGUE IN EGYPT
IMMUNISATION
MOUSE NEUROTROPIC FIXED VIRUS

By PROFESSOR ZAKI MORCOS, F.R.C.V.S., M.V.Sc., D.V.H.(Eng.),
Cairo Veterinary College (*May*, 1945).

Literature

Purchase[1] used the phenol-glycerine vaccine (Todd's method) on 46 birds; 19 survived the three inoculations given, and only 9 were found immune when tested with virus seven days after the last dose of vaccine. Seven days in the dark at 21° C. were not long enough for the vaccine to lose virulence.

Contrary to Todd, Purchase reported that the action of the phenol appears to be dependent upon the presence of bile rather than upon the absence of hæmoglobin. Bile added to the vaccine accelerated its devitalisation. There was no evidence of immunity of birds vaccinated with muscle tissues without the addition of liver or bile.

Purchase[2] studied the Egyptian virus and confirmed the observations of Lagrange that the period of incubation was four to five days, and the low virus content of the blood in artificially-infected fowls compared with that of fowls dead of plague following natural infection. Young pigeons and adults resisted infection with both Egyptian and fowl plague virus, whereas the virus of Newcastle disease was invariably fatal to both.

Both the Egyptian virus and the fowl plague virus cause infection by contact to 25 per cent. of exposed fowls, while the Newcastle virus is invariably fatal to fowls exposed to contact.

Cross immunity tests proved that the Egyptian virus and the fowl plague virus were indistinguishable, but the Newcastle virus was distinct from both.

Kylasamaier[3] noted dullness, whitish diarrhœa, dyspnœa and ropy saliva lasting for four days; P.M. congestion of the alimentary tract, punctiform hæmorrhages on the pericardium, and proventriculus and pin-point ulceration of the cloaca.

As a vaccine, formalised liver emulsions gave encouraging results. He found that calves resisted fowl-pest virus, but rinderpest virus killed nine fowls in four to sixteen days.

Nieschulz[4] found that the virus of fowl plague is present in the peripheral blood several hours before death, and that mosquitoes, after being freed in proximity to affected fowls, carry the virus for four days, and sometimes as long as sixty-eight days; this was proved by crushing the mosquitoes and injecting them intramuscularly into susceptible fowls. Similarly exposed mosquitoes, when fed on healthy fowls, failed to transmit the disease.

Purchase,[5] using seven different strains, failed to prove the presence of immunologically distinct strains of fowl plague virus.

Four experiments on four fowls proved that immunity resulting from artificial infection is of short duration; fowls which are able to resist gross natural infection succumb rapidly to intramuscular inoculation with a minute dose of the virus.

Purchase[6] showed that the virus in carcases stored under trade "chilling"

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conditions (31° F. to 38° F.) survived for 278 days in muscle and for 303 days in bone marrow.

He failed to infect fowls by feeding infected muscle.

Cooper[7] proved by cross immunity tests that Ranikhet disease was indistinguishable from Newcastle disease (England), Avian pseudo-pest (Java) and Avian pest (Philippine Islands).

He described Ranikhet disease as an acute and highly infectious condition of fowls characterised by respiratory distress and a high mortality, and showed that serum from recovered fowls protected susceptible fowls, while serum prepared from hyperimmunised donkeys conferred no protection.

Lagrange[8] considered the Egyptian virus as a peculiar type on account of the longer period of incubation, its extreme infectivity by contact or by ingestion.

The disease has a definite seasonal occurrence from December to June, and is rarely seen during the rest of the year.

Lice failed to transmit the infection, while sparrows are susceptible; after four passages through sparrows, the virus was still full of virulence for the fowl. Virulent blood in sealed tubes kept in the cold room remained virulent for more than twenty-five months.

There was no evidence of the existence of a natural immunity to the disease, and the mortality approached 100 per cent. Occasional healthy carrier fowls were found, but some were not resistant to the disease. An acquired immunity was induced by the injection of two doses of virulent brain or testicle attenuated by desiccation for six and three days, respectively. Dried spleen was impotent as a vaccine. Formalised or glycerinised spleen gave a perfect immunity, but liver preparations were inactive in this respect.

Immunised fowls could be reinfected with large doses of the virus.

Morcos[9] showed that when the infection was present in a peracute form affected fowls may be found dead. The sub-acute disease is indicated by swelling of the joints, dullness followed by paralysis without coma, profuse salivation, copious nasal discharge, and discoloration of the unfeathered parts of the body. The death-rate is practically 100 per cent. The virus passes Seitz L5 and L3 filters. The blood, serum and elements or washings of blood elements are highly infectious, as well as fæces and oculo-nasal discharges. Contaminated food or water, as well as contact, are means of spread. Egyptian-bred pigeons are resistant to the Egyptian strain. Virulent blood heated or treated with chemicals did not confer immunity.

Formalised spleen emulsions were protective in single doses. Liver emulsions treated by chemicals did not protect in two doses.

Levaditi and *Lepine*[10] have observed that the fresh serum of fowls affected with fowl plague has the power of reducing certain colouring agents, e.g., methylene blue, cresyl blue, and jaune green, when the serum is added to a 1/400 solution of the dye, the tube sealed with vaseline and kept at room temperature or at 37° C., but not at a temperature below 0° C.

Lagrange[11] reported that fowl plague in Egypt has a sharply marked seasonable occurrence, from December to June, the mortality varying between 50 per cent. and 100 per cent.

The brain, liver, spleen, blood and filtered fæces of five naturally-infected fowls which had died after showing typical symptoms of the disease were found to be avirulent, but the brain tissues of these fowls immunised healthy fowls.

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About the same period it was found that a fowl which had recovered from natural infection with plague had not acquired any immunity against the disease. At other times, brain tissues from infected fowls were avirulent, but spleen and liver tissues from some of the fowls were infective.

The author attributes autosterilisation to the season of the year, and holds that autosterilisation occurred only after death.

Lagrange also observed that when vaccinated fowls were tested for immunity the death-rate varied, and that in these fowls while the brains were always virulent the blood and other organs were avirulent.

Manninger[12] passaged the Newcastle virus ten times, when it became partly fixed, causing death on inoculation in forty-eight hours.

Parallel experiments with an Austrian strain of fowl plague virus showed no differences between the diseases produced by the two strains with regard to the inconstant results in healthy fowls in contact with infected fowls or by feeding morbid material.

Recovery from fowl plague is very rare, hence the difficulty in comparing the two viruses by cross immunity tests. However, artificial immunisation and cross immunity tests proved that both Newcastle disease and fowl plague are similar, but one has become modified in type.

Hallauer[13] found that the virus did not survive for more than forty-eight hours on killed chicken embryo pulp tissue, while on fresh living tissue pulp from chicken embryos the virus survived for eighty-eight days and withstood nine passages at eight days intervals.

In tissue cultures prepared from the embryo pulp of the pigeon, goose and duck, the virus propagated in a similar manner as in the fowl embryo, but there was no evidence of multiplication of the virus in tissues prepared from the embryo pulp of the rat or mouse.

Plotz[14] successfully passaged the virus fifteen times in living embryonic cells over a period of ninety-four days.

Todd[15] concluded: "In the centrifuged blood of infected fowls the virus is found mainly in the white cell layer, the concentration of the virus in this layer being roughly 100 times that in the clear plasma or in the washed red blood corpuscles.

"Attempts to repeat Marchoux's and Landsteiner and Berliner's work on the cultivation of the virus *in vitro* gave entirely negative results with the particular strain of the virus used.

(Marchoux, in 1908, used test-tubes of 20 mm. diameter containing a column of defibrinated fowl blood overlying a column of glucose peptone, agar and were grown aerobically. Inoculation of the tubes was made by means of a fine platinum wire dipped to a depth of one centimetre into virulent blood and the culture grown for three days. In this way a series of ten successive passages were made.)

"The cloacal secretions of sick birds are very highly infective, and the infection of healthy fowls is produced with ease by dropping a dilution of these secretions into the cloaca without otherwise touching the mucous membrane.

"Direct infection via sexual intercourse is a very probable means."

Todd[16] found that heated antigens (virulent blood, internal organs, etc.) gave entirely negative results.

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Attempts to immunise fowls with formalised virus were also unsuccessful. A solid immunity against the disease can be constantly produced in fowls by the use of a phenol-glycerine-vaccine prepared from the liver of birds dead of the disease.

(The liver of a fowl which had died of the disease was ground up in a mortar with glass powder and emulsified with four times its weight of the following solution: Phenol 0.5 gm., glycerine 60 c.c., and distilled water 39.5 c.c.

The resulting emulsion was placed in a stoppered bottle and kept in a dark place in the laboratory at about 20° C. for seven days (after which it was kept in the ice-box); three weekly successive doses were used: 0.5 c.c., 1 c.c., and 3 c.c.; a week later the birds were found immune on testing with virulent blood under controlled conditions.)

Tricresol used in place of phenol in vaccine preparations was apparently satisfactory.

Birds immunised with a vaccine prepared from the English strain of the virus were found to be immune against the Dutch (de Bliech), the French (Staub), and the German (Miessner-goose) viruses.

Plotz[17] cultivated the virus on minced chick embryo suspended in Drew's medium, and found that it increased appreciably after twenty-four hours at 37° C. Repeated subcultures were made every twenty-four hours for twenty-eight consecutive days; the final passage, representing a sixfold dilution of the initial culture, killed a hen in a dose of 1/500,000 c.c.

Plotz and Ephrussi[18] concluded that the virus can be grown in the presence of living cells which are not multiplying, since sections of the fragments of tissue no longer showed mitotic figures, and the addition of the virus also failed to stimulate cellular proliferation.

Plotz[19] found that the virulence of the virus diminished more quickly in presence of a large number of cells than when a small number only was present in the medium of embryonic cells suspended in Drew's liquid.

Plotz[20] reported successful results on embryonic cells of young ducks, as well as on chick cells.

Fukushima[21] carried out histological examination on tissues from artificially infected fowls in formal saline and stained by the hæmatoxylin eosin. He found three types of necrosis, viz.:

(1) Simple necrotic foci as a primary lesion in acute cases.

(2) Collections of large vesicular cells, when virus was weak.

(3) A combination of (1) and (2).

Fukushima,[22] on studying the pathology of sections, found that the spleen sometimes showed hyperplasia of the reticulo-endothelial cells, hyperhæmosiderosis and degenerative changes, whilst the central nervous system showed a lymphoid infiltration of the adventitis of blood vessels.

Changes in the central nervous system always occurred.

Seidenberg[23] failed to confirm the findings of Collier (1932, Zschr. Hyg. 113, 758) that white rats inoculated intratesticularly or intracerebrally with Rous sarcoma virus acquire an immunity to an additional infection with fowl plague virus.

Elford and Todd[24] estimated the size of the virus particles as they exist in the body fluids of the fowl as between 60 and 90 mu. by means of collodion membranes. *Staphylococcus K. bacteriophage* (size 50 to 75 mu.) was used as a con-

trol and filtrates were controlled by inoculation in various dilutions into susceptible cockerels.

Hallaver[25] was unable to confirm the multiplication of the virus in Maitland's medium (Maitland and Laing, 1930, *J. Brit. Exp. Path.*, II, 119), but the virus survived a considerable time in this medium and degeneration occurred slowly. In living and actively multiplying brain-tissue culture, multiplication of the virus occurred, but when degeneration commenced it preceded very rapidly.

Carpano[26] concluded that the virus disease of fowls endemic in Egypt was the classical fowl plague, and that Newcastle disease does not occur in Egypt. The virus failed to infect pigeons.

Burnet and Ferry[27] attempted differentiation between fowl plague and Newcastle disease by the inoculation of the chorio-allantoic membrane of the developing egg.

The investigation comprised a study of:

(1) The gross and microscopic changes in infected eggs.
(2) The dimensions of the virus particles as judged by membrane filter.
(3) The resistance of the viruses to photodynamic inactivation by methylene blue.

	Fowl Plague Virus.	*Newcastle Virus.*
(1)	Absence of ectodermal cell infiltration and absence of inclusion bodies	The membrane revealed ectodermal cell infiltration, vacuolation and necrosis.
(2)	60 to 90 mu.	80 to 120 mu.
(3)	Less resistant to methylene blue.	More resistant to methylene blue.

Plotz[28] recorded the virulence of culture virus after seventy-two subcultures in a tissue culture medium.

Immunity with the culture virus antigen was similar to the natural virus antigen.

Kondo and Nakamura[29] found that the efficiency of chemical reagents in preparation of virus vaccines against fowl plague depended upon the organ which was selected. Brain tissues were of value when treated with formalin or glycoholic acid, and valueless in chloroform or saponin.

Spleen virus antigen is valuable in the presence of formalin, ether or chloroform, and valueless in glycoholic acid.

Killed emulsion gave no protection.

Nieschulz[30] passed the virus through 100 mice without loss of virulence. Mice were inoculated intracerebrally, intraperitoneally or subcutaneously.

Plotz[31] cultivated fowl plague virus for two and a half years, and material from the 100th passage in a very high dilution killed a fowl in forty-eight hours.

The following medium was used:—4 c.c. modified Drew's fluid sterilised by filtration is placed in Erlenmayer flasks of 75 c.c. capacity. To this is added 0.5 g. of finely minced embryos in 1 c.c. of the modified Drew's fluid. These flasks are kept at 37° C. for twenty-four hours and examined for sterility. One c.c. of a mixture of several cultures is introduced; the flasks are kept in the incubator for three days to test for sterility and then transferred to the cold store at +4° C. until material is required for the next sowing.

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Balozet[32] infected pigeons with the virus of fowl plague by inoculation into the brain; the virus remaining localised up to the fourth passage, after which the blood and organs contain the virus.

Symptoms in pigeons were excitement and paralysis, while some look very sleepy and few recover.

After the fortieth passage, a small portion of the pigeon's brain caused death on inoculation into a fowl.

On inoculation into the brain of a rabbit the virus of fowl plague may be recovered within forty-eight hours of inoculation, suggesting the establishment of immunity without apparent infection.

Beaudette, Hudson and Saxe,[33] on recording an outbreak of fowl plague, observed that:

At post-mortem there was œdema of the head parts, severe hæmorrhagic tracheitis and peritoneal œdema, hæmorrhage on the heart, pleura and under the cuticle of the gizzard; the virus passed Mandler candle, but not Seitz disc; blood serum from an immune bird neutralised the virus *in vitro*; carriers do not appear to exist, and in recovered birds the virus could not be detected; phenol-glycerine liver emulsion failed to produce active immunity; and transmission of infection via mosquitoes failed.

Picard,[34] on comparing Newcastle disease and fowl pest, found that both viruses are closely related; he attributed the differences to the variation of the virus from a common parent strain.

Introduction

Mortality in fowl plague being almost 100 per cent., and blood as well as tissue antigens being inconstant, led me to think of attenuation via passage into different species, i.e., the production of a fixed virus.

At the start I had not much hope of success in attempting to pass the virus from birds into mammals; however, it proved successful, and the virus was passed by subdural inoculation of defibrinated infected fowl blood into white mice and became fixed after the fifth passage.

Experimental

Experiment 1.

Virulent blood obtained from an infected chick about three months old on the point of death was defibrinated and diluted fifty times with sterile saline solution. Not more than one drop of this was inoculated intracerebrally into mice Nos. 1 and 2, and intramuscularly into two Egyptian-bred chicks—these were controls 1a and 2a; each received 0.25 c.c. The average weight of chicks used in these experiments was 200 to 250 grams.

Result.—The two chicks 1a and 2a died early on the third day. Blood films and blood cultures were negative.

The two mice 1 and 2 died on the seventh day; a few hours before death the mice showed a very short stage of excitement; then they became quiet and continually attempted to rub their noses with their fore-feet; every quarter of an hour or so they turned over on one side and sat upright again.

Experiment 2.

Mice 3 and 4 were inoculated intracerebrally and chicks 3a and 4a intramuscularly with 1/25 brain emulsion in saline of mice 1 and 2.

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Fowl Plague—Sub-acute form, characteristic œdema of head and purple colouration of unfeathered parts.

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Result.—Mice 3 and 4 died after six days after showing same symptoms as those above. Chicks 3a and 4a died four days following the inoculation.

Experiment 3.

Mice 5 and 6 were inoculated intracerebrally and chicks 5a and 6a intramuscularly with 1/25 brain saline emulsion from mice 3 and 4.

Result.—Mice 5 and 6 died after five days with similar symptoms as shown by mice in the previous experiments; chicks 5a and 6a died after four days.

Experiment 4.

Mice 7 and 8 were inoculated intracerebrally and chicks 7a and 8a intramuscularly with 1/25 brain saline emulsion of mice 5 and 6.

Result.—Mice 7 and 8 died after four days and chicks 7a and 8a after five days.

Experiment 5.

Mice 9 and 10 were inoculated intracerebrally and chicks 9a and 10a intramuscularly with 1/25 brain saline emulsion of mice 7 and 8.

Result.—Mice 9 and 10 died after three days showing nervous symptoms few hours before death, and chicks 9a and 10a died after six days.

Experiment 6.

Mice 11 and 12 were inoculated intracerebrally with 1/25 brain emulsion of mice 9 and 10.

Result.—Both mice died after three days.

Experiment 7.

Mice 13 and 14 were inoculated intracerebrally with 1/25 brain saline emulsion of mice 11 and 12; both died on the third day, the same symptoms preceeding death. The most convenient seat for intracerebral inoculation is just above and posterior to the eye.

Having the incubation period fixed to three days, the following two antigens were prepared.

Preparation of Vaccines

Vaccine A.—One gram of fixed virus tissue (i.e., 1 c.c. brain) was dried for three days in presence of caustic soda and concentrated sulphuric acid. (The jar, with a close-fitting lid, was 1,700 c.c. capacity; 45 grams of caustic soda sticks and 25 c.c. of sulphuric acid were used.) The tissue was then emulsified in 50 c.c. sterile glycerine saline, two drops of pure carbolic acid were added, and the emulsion was shaken at intervals for forty-eight hours, after which it was used.

Experiment 8.

Five chicks were used (11a, 12a, 13a, 14a and 15a). Each received intramuscularly 0.25 c.c. vaccine A (dried and carbolised).

Result.—Chicks 11a, 13a and 14a died on the fifth day, and chicks 12a and 15a on the sixth day.

Remark.—Dryness did not aid in attenuation.

Vaccine B.—One gram of mouse fixed virus (brain emulsion) was emulsified in 50 c.c. glycerine saline, two drops of ether added, and the emulsion was shaken at intervals for two days at room temperature, after which stored in ice-chest and then used.

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Experiment 9.

Chicks 16a, 17a, 18a and 19a each received intramuscularly 0.25 c.c. of vaccine B (ether-treated brain emulsion). The fowls remained healthy, and seven days later each again received 0.5 c.c. vaccine B. Ten days following the second injection each was given intramuscularly 0.1 c.c. virulent fowls' blood, diluted 1/1,000 in saline. Fowls 20a, 21a and 22a (controls) received the same dose as the vaccinated chicks.

Result.—All controls died early on the third day following inoculation; the vaccinated fowls died on the fifth and sixth days.

Experiment 10.

Chicks 23a, 24a and 25a each received two doses of vaccine B (the same interval and the same quantity as in experiment 9); virulent blood was given by means of a pipette; the amount was 2 c.c. 1/50 blood in saline. Control chicks 26a, 27a and 28a were similarly fed the same dose. All vaccinated and control chicks remained normal. Twelve days following the feeding of the virulent blood, each chick received intramuscularly 0.1 c.c. of 1/1,000 fowl virulent blood in saline.

Result.—The three controls died early on the third day and the vaccinated chicks on the fifth and sixth day following the test dose.

Remarks.—(a) Feeding on virulent blood seems to be ineffective in setting up infection without some other physical or pathological factor being present.

(b) To find accurately the minimum ineffective dose of virulent blood is difficult because of individual bird susceptibility.

Experiment 11.

Chicks 29a, 30a, 31a and 32a each received intramuscularly one dose of 1 c.c. of vaccine B; fifteen days later they, along with controls (chicks 33a, 34a and 35a), were tested with 0.1 c.c. of 1/10,000 virulent blood in saline.

Result.—Controls 33a, 34a and 35a all died early on the morning of the third day. Vaccinated chicks 29a and 30a died on fifth and sixth day; 31a and 32a were found dead on the seventh day.

Experiment 12.

Ten chicks (36a to 45a) received a similar dose of vaccine as in previous experiments, and five more chicks (46a to 50a) were given intramuscularly double the dose. These will be exposed after a month to natural infection under natural conditions in a garden together with five control chicks (51a to 55a). Infected fowls will be admitted and left with them, and the result will be reported in due course.

Summary and Discussion

Fowl plague virus was passed through white mice by subdural inoculation. At the beginning the incubation period was seven days; after the fifth passage the incubation period became fixed at three days. At the same time the virus became attenuated to fowls with a six days incubation period, instead of an average of three days. Dryness did not aid attenuation, but ether treatment definitely did so. Feeding of fowl plague virus seems to require some accessory factor in order to cause the disease. To determine the minimum infective dose is difficult; it depends upon individual bird susceptibility and virulence of the virus. A large scale experiment is expensive, but it is hoped to test immunity by natural infective methods. The neurotropic mouse ether-treated virus is a promising antigen.

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INTERNATIONAL VETERINARY CONGRESSES

By DR. DRAGUTIN HOMAN.

War events are of serious detriment to a favourable development of veterinary science. This is especially the case in matters concerning the international collaboration of veterinarians for the promoting of veterinary science and its practical applications.

So far, regular meetings of the International Veterinary Congresses have been the only method by which the veterinarians of the whole world could meet and exchange views on this common field of work. During the period of time in which thirteen veterinary congresses have been held—from 1863 to 1938—this form of activity has twice been stopped, and in each case for a long while. The German-French war (1870-1871) and the political disorder in Europe interrupted the continuity for sixteen years, and the Great War (1914-1918) also caused a standstill of sixteen years. Likewise, the present war also is menacing the international collaboration. Since the last meeting, in 1938, seven years have already passed.

Of the above-mentioned periods of the interruptions of continuity we must especially point out the pauses after the war, the time passing between the end of a war and the first convocation of an after-war congress. During a world war little can be done to maintain international relations, and unfortunately these conditions persist for some time after the end of the war. History has shown that the good work of after-war congresses hitherto held has not been implemented immediately. Already voices are to be heard, calling for the convocation of international congresses and for a renewal of the collaboration of the veterinarians of the whole world. International relations are severed by war, and when peace comes an entirely new start has to be made, but this beginning of the work is always deferred. During the war, however, and in the post-war period, there are problems, increasing from day to day, which require a prompt solution. Therefore, too long pauses in after-war time are dangerous and impede the advancement of the science itself and of the profession.

Twelve whole years passed after the end of the war to the convocation of the 4th after-war congress in Bruxelles, 1883, and the same period of time to the meeting of the 11th congress in London, 1930. How many years of a barren pause may pass again from the end of the war in 1945 to the next congress?

"How are we to shorten this interruption in the continuity of the veterinary congresses, and how are we to keep and to deepen the idea of international collaboration?" These questions have a great bearing on the successful development of veterinary science and for improving the international relations and authority of the profession.

The Congress-idea

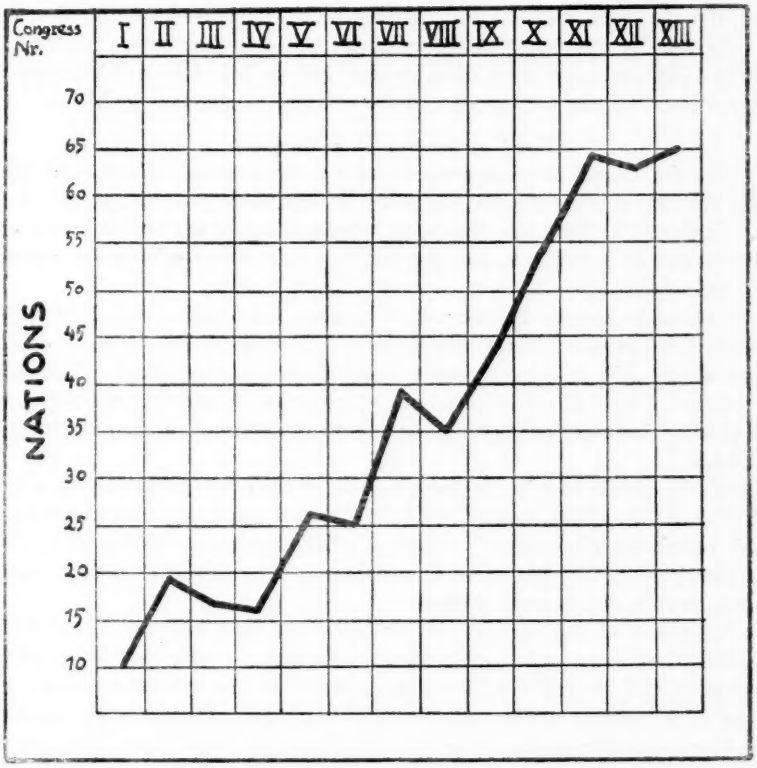
In consequence of the great development of international commerce in cattle and cattle products, and a greater diffusion of infectious diseases in the second half of the nineteenth century there arose many special veterinary problems of an international character. Such problems cannot be solved by independent measures of the single states. The one-sided prescriptions of the nineteenth century did not correspond to the exigencies then arising, and the veterinarians of Europe were conscious of the gravity of such a situation. England suffered greatly from the diffusion of infectious diseases.

The notable veterinary expert, Professor John Gamgee, of Edinburgh, was

the first to formulate a concrete proposal for the solution of these problems. He, clearly discerning their importance, said: "It is necessary to convocate an International Veterinary Congress which will discuss those questions and submit common proposals for the solution of those problems to the interested states."

On his own initiative he sent out in April, 1863, invitations to a meeting in Hamburg. Hundreds of invitations were sent out to Veterinary High Schools, to Professors of Veterinary Medicine and to practising veterinarians, but on the European continent only.

Professor Gamgee therefore became the founder of the International Veter-



The Number of Nations at International Veterinary Congresses.

inary Congresses and of the collaboration of European veterinarians, the basis on which all subsequent congresses have been built.

That congress was the first manifestation of an efficacious international collaboration.

Since that time the congress idea has been developed and extended with persistent force all the world over. From the little group of veterinarians—in all 103—who had assembled at the first congress a large community has grown up, which reached its greatest numerical extent at the 12th congress, in New York in 1934, when the number of the members was 3,341.

Statistics show a steady growth from one congress to the next one. With the increasing number of the participants the number of the nations interested

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increases too, and gradually, as all continents enter in its compass, the congress acquires more and more a true international character.

At the first International Veterinary Congress representatives of European states only assembled. At the 2nd congress, in Vienna, 1865, veterinarians from Asia participated, from the 4th congress in Bruxelles, 1883 on, America became a permanent and active member, the 5th congress in Paris in 1889 had amongst its participants representatives from Africa, and at the 13th congress, in The Hague in 1909, we find Australia represented. Therefore the 13th congress was the first truly international congress including veterinarians of all five continents. This world character has been maintained in all subsequent congresses.

Gradually the number of the participating nations increased. At the first congress only *ten* European nations met, while at the last congress, the 13th, in Zürich in 1938, representatives of *sixty-five* nations joined in collaboration for the advancement of common ideals and the solution of common problems.

The Components of a Congress

Within the frame of a congress are three fundamental elements of international veterinary collaboration, the scientific, the social and the technical elements. Each one of them has developed independently in the course of the congresses hitherto held, yet in mutual harmony without compromising the concordance of the whole.

The scientific activity has at all times been the fundamental base of the veterinary congresses. During the reports and discussions questions are debated and special scientific demonstrations and exhibitions are organised. The members gladly seize the favourable occasion of a congress for pointing out their problems and searching for their solution before an international forum representing their science.

Regularly questions only are discussed which are of actuality for the specific period of time. Since the institution of the " Permanent Committee of the International Veterinary Congresses " during the 8th meeting, in Budapest in 1905, care has been taken that the scientific programme is arranged in such a manner as to guarantee a full mutual interest.

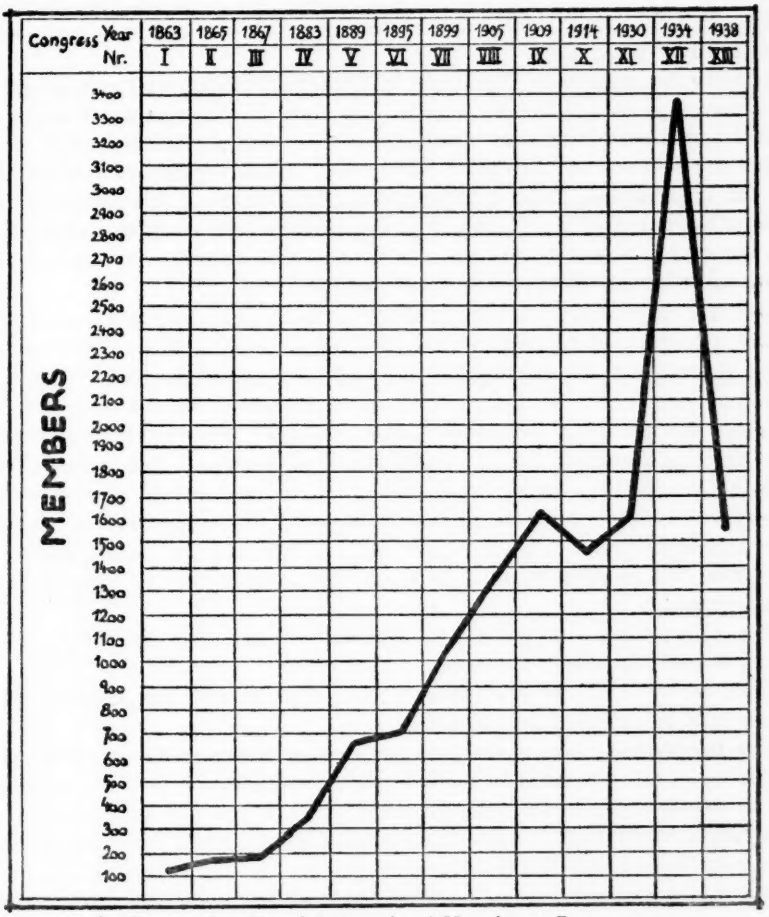
In the course of the meetings which have been held hitherto the work has been extended to more and more branches of veterinary science. Whereas the first congress had treated the infectious diseases of the domestic animals and questions of veterinary police only, and had only touched upon other questions of veterinary scientific work, at the last congress there were many different sections arranged according to a precisely worked out plan, such as infectious diseases, parasitic diseases and parasitology, tropical diseases, poultry diseases, cattle diseases, medicine and surgery, veterinary physiology, inspection of meat, milk hygiene, cattle breeding, veterinary education and military affairs. Beside the above-mentioned special branches there were discussions on the organisation of the state service, on the sale of veterinary medicaments, veterinary hygiene, anatomic nomenclature, jurisprudence, bacteriology, practical questions of veterinary practice, obstetrics, and nutrition.

The increasing number of special branches only serves to accentuate or bring to notice the great number of problems awaiting solution. The first congress had on its programme a total of *eight* questions only, whereas at the last congress there were *forty-four* submitted.

The congresses especially endeavour to make their influence felt in matters

of international importance, and to guide or influence the scientific world and the administrations of states in order to obtain everywhere a uniformity of thought and action. With this in mind 112 resolutions have been propounded.

The organisers of the congresses appreciate also the social side. These functions are ideal places for the development of a lively sociability, for they are meeting-places of men of many nations of the same profession, and therefore of common interests and views. The social side has been appreciated equally highly as the scientific. Members have the opportunity to become acquainted, acquaint-



The membership of International Veterinary Congresses.

ance leads to friendship, and friendship in itself solves many intricate problems.

At the earlier congresses, when there were about a hundred participants only, it was relatively easy to organise the social side. Later, however, as the number of the participants grew up to one thousand and more, social activities had to be organised with much greater care in order to make it possible for the members to get acquainted. Special committees are entrusted with this task. Excursions, inspections of veterinary institutions, visits to other cognate scientific

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institutions, special and artistic exhibitions are arranged. The town where the congress is meeting and its environs are visited by the participants in common.

The congresses which have been held hitherto have always closed with a solemn banquet. Some states and towns have given special receptions and banquets in honour of the congress guests and as a tribute to the profession they represent. A glance at the toast lists on those occasions shows an agreeable sociable atmosphere at those gatherings and the good fellowship among the veterinarians of the whole world.

This good fellowship has increased still more, for since the 7th congress, in Baden in 1899, many veterinarians participating in the congresses have been accompanied by their ladies.

Until to the congress at The Hague in 1909 (the 9th congress) each congress had its own separate regulations or rules, but there the "Permanent Committee of the International Veterinary Congresses" proposed regulations which were adopted and followed at subsequent congresses. Those regulations concern the aims, the organisation, and the convocation of the congress, the rights of the members, the duties of the managers of the congress, the establishment of sections, the course of the discussions, the closing of a congress, the reports, the keeping of archives and, finally, financial matters.

Before a congress it is the duty of the Organising Committee to concern itself with the arranging of the programmes of scientific work and social gatherings and the general plans for running the congress. For special purposes, if needed, special committees are set up. With the organisation of the more recent congresses the following committees have operated: Programme, Exhibition, Report-printing, Financial, Press, Local Gatherings, Reception, and Ladies' Committees. Since the 9th congress an Honorary Committee has been created whose members are high state functionaries and diplomats of the states which participate in the congress. In most states—since the 7th congress, in Baden—National Committees also are established to undertake propaganda for the congress and to admit members.

The above-mentioned committees submit proposals concerning the programme to the Organising Committee.

Since the "Permanent Committee" has been instituted the scientific programme must be approved by that body.

The pre-congress organisation has to arrange and plan the scientific and entertaining social programme, while the main organisation has to solve all technical questions during the congress itself.

A special secretarial office or congress office is established for the execution of this work before and during the congress.

In the past such congresses have amply proved their value to the community and to the scientific and social advancement of our profession, and the work of the pioneers who initiated and planned them will serve as a solid foundation for future progress. It is increasingly apparent that it is necessary to extend international scientific and social collaboration beyond the narrow limits of the few congress days by aid of suitable technical means.

From the scientific point of view especially there can be no doubt that it would be good policy to extend and to deepen the academic side, and particularly its practical application. The work and the problems of the various sections which have already been established are not by any means exhausted, although they have

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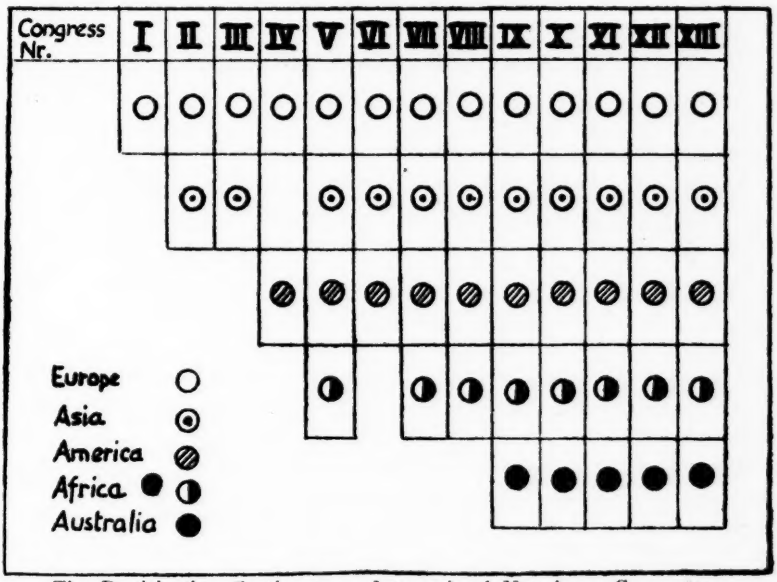
have been objects of congress discussions, and there are many other questions which have not been dealt with at all. The extent of that work will grow larger, as during this war many new veterinary problems have been manifested. Veterinary science acquires more and more importance in world economy and ample possibilities for further development exist. International relations depend more and more upon social contacts between individuals and nations, and at the present time there are great opportunities for the propaganda of a true international friendship by means of the social gatherings at the congresses.

The technical side of the congress organisation, too, must strive for a greater perfection in order to be able to meet all new demands.

Acknowledgment of the Congress Work

Any effort to cultivate and sustain international collaboration amongst the scientific, social and technical workers of the world could not but stimulate the attention and the acknowledgment of all interested circles.



The Participating Continents at International Veterinary Congresses.

To the 2nd congress, in 1865 in Vienna, held two years after the successful first international meeting, many European states sent official representatives who were entrusted with the task to follow the discussions and to bring back official reports. Since that time delegates of more and more states have attended, and at the more recent congresses nearly all states have been officially represented and their delegates have participated actively in the work. Some local administrations with special interests in veterinary police measures have sent their delegates too. Since the 5th congress, in 1889 in Paris, we note there were more and more numerous representatives of home and foreign towns. Occasionally, also, special representatives of important agricultural societies from the different parts of the world have attended. It is gratifying to note that many governments have recognised the necessity of appointing official delegates or observers.

Since the 4th congress, in Bruxelles in 1883, all following congresses have

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been held under the protectorate of the sovereign or of the highest dignitaries of the state where the meeting has been held : also the governments of the respective states have given assistance on the financial side.

These meetings attract representatives of cognate science, as well as those persons who come directly or indirectly in the veterinary sphere of action. Numerous physicians, agronomists, scientists, chemists, landed proprietors, industrialists, members of parliament and high state functionaries participate as extraordinary members in the meetings and follow with keen interest the work of the congresses.

Jointly with that interest goes the acknowledgment or recognition. That this acknowledgment or recognition of the efforts and aims of International Veterinary Congresses is no small matter appears evident from the fact that the decisions of the congresses are taken into consideration and their principles followed when new legislative measures are framed.

No government could ever overlook the resolutions and collective decisions of the leading international representatives of veterinary science.

The Congress—a Necessity of the Present Epoch

All thinking people recognise the value of international collaboration, and the international congresses are one of the methods of attaining this end. They are a fundamental and exacting necessity of this epoch.

We are greatly indebted for this first degree of international co-operation to the improvements in means of communication with the most remote continents. Manifold connections have been thus initiated among the different nations. The fact that the nations have got nearer to each other on the political, cultural and especially on the economical field has raised the necessity to take uniform measures in the different branches of the human activity, and therefore also in the veterinary field. The extension of the veterinary congresses, which encircled in a comparatively very short time the whole world after a development of about forty years (the 9th congress, at the Hague in 1909), proves that veterinarians have understood the necessity and the usefulness of congress work.

In as much as this general and fundamental necessity is satisfied, people become aware of the usefulness of congress work for the development of veterinary science, for public health and for general economic progress. From the point of view of veterinary science its special advantage lies in the fact that the congresses afford them the best opportunity to exchange the results of scientific research and the most recent achievements of science in the most direct and immediate way and to spread them all over the world. There the people give and get the impulse for scientific researches and their practical applications. The resolutions which are taken at the congresses tend to clarify complicated problems. Such activity creates the basis for international progress and for the development of veterinary science.

The numerous intimate social contacts formed during the congress are of the greatest advantage. The personal contact with prominent authorities has in many cases an important influence on the improvement of professional consciousness and friendship. Many of the veterinarians remain in correspondence with each other and keep up friendly relations in the spirit of good fellowship of the congress days.

Public health also profits from the work of veterinary congresses. The scientific discussions of the congresses show the clear conviction that public health

ought to be ruled only by laws which guarantee the possibility of fighting against diseases of animals and of producing able veterinarians.

It is a matter of fact that the general welfare depends greatly on the wealth resulting from the keeping of domestic animals. Nearly all the items on the agenda of a veterinary congress refer to the study of how to keep up and to improve the stock of domestic animals. By this work the congress becomes a foundation stone for the advancement of all economic progress.

The Necessity to Keep Up and to Deepen International Co-operation

On account of the general development of the International Veterinary Congresses as hitherto observed, and of the extension of their influence all over the world, and, furthermore, in consideration of the importance of their work and its development, and accepting that they are necessary and useful, and acknowledged by governments, we come to the following conclusions :—

This international collaboration of veterinarians must be kept up and strengthened.

Conscious of the necessity to keep up and to deepen international collaboration as an imperative step towards world harmony, and to the solution of post-war problems it is essential that we shorten the long-lasting interruption in the continuity of veterinary congresses, and so foster and deepen the idea of the international collaboration.

The " Permanent Committtee of the Veterinary Congresses " which was elected at the 13th meeting, in Zürich in 1938, should without delay fix the next place of meeting and the date of future congress. If difficulties occur support should be requested from the " United Nations."

By a speedy convocation of the congress we will keep the idea of international co-operation in a vital healthy state, and in order to *deepen* that idea too, an " International Veterinary Union " should be instituted at the next congress.

This Union would link together the veterinarians of the whole world in a strong bond of unity and friendship which would *permanently,* and not periodically (like the congresses), advance veterinary science and its practical application.

This work should be undertaken by an " International Veterinary Office " as the managing organ of the Union. This Office should have, beside a Secretarial Office, a Department for the Exchange of Information on Scientific Matters, a Social Section, and a Propaganda Department.

The *Department for the Exchange of Information on Scientific Matters* would take care of all questions concerning the general advancement of veterinary science and its practical application. It would institute International Committees and Commissary Organisations for special important questions. It would organise different special inquiries. It would take care that at congresses where questions concerning the sphere of activity of veterinarians are discussed representatives of veterinary science also participate with their competent reports.

That department should publish editions of the works of veterinary specialists and arrange lectures by prominent experts in different states.

The *Exchange Department* should also organise a far-reaching exchange of young veterinarians between all states in order to offer those young people the chance to study the conditions abroad and to work in scientific institutions and with prominent practicians.

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The *Social Department* should devise measures for improving general social contact and personal intercourse.

It should promote and encourage a permanent social correspondence among the veterinarians as well as the exchange of thoughts on professional common interests. This department should also take care of the improvement of professional conditions. Along with this excursions abroad could be organised.

The *Propaganda Department* has a far-reaching task to fulfil; to educate the public and to develop a general interest in veterinary matters. It should publish popular scientific books, organise popular veterinary lectures and broadcast talks, take care that instructional films on veterinary medicine are produced and that propaganda exhibitions are organised. A special Press Office should put veterinary news, short popular scientific articles and illustrative materials at the disposal of the world press.

All that work could be reflected by a newspaper, if possible a weekly, which could publish all its news in several universal languages.

An "International Veterinary Union" and its business managing office would give us a new technical form and frame of international collaboration which in consequence would rise from its first and initial phase of periodical and irregular congresses to a higher phase characterised by a permanent and uninterrupted activity.

The International Veterinary Congresses will then represent a plenary meeting of the Union, and the activity of the Union will bestow on them an augmented importance.

We have to point out that the work of the Union with regard to the advancement of the international friendship and understanding, as well as to the raising of general welfare, would conform to the principles and ideals of the United Nations which were decided in San Francisco.

Therefore a close collaboration between the "International Veterinary Union" and the Organisation of the United Nations is necessary, for mutual utility and prosperity.

By the accomplishment of this extensive work in the spirit of democracy the Veterinarians of the Free Nations of the world will solve the problem which the present epoch has imposed on them and fulfil their duty to their profession as well as to the international and national economy.

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Comminuted fracture of the humerus in a horse.

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Clinical Article

COMMUTED FRACTURE OF THE HUMERUS IN A HORSE FROM MUSCULAR CONTRACTION

By JALAL-UD-DIN SHUJA,
M.R.C.V.S.

As the fracture of the humerus in animals due to muscular contraction is rarely seen, the following case seen recently in London is thought worth recording.

Subject: Aged Grey Gelding (Heavy Type).

History: The horse was in excellent condition and health and worked regularly in pair harness. On the day of the accident the carter, having picked up a load at a point in town, started them off; the horses broke into a trot and on reining them in the horse in question went severely lame on the near fore leg.

On examination marked displacement and crepitus was detected in the humerus.

Prognosis of complete fracture of the humerus in a heavy type horse being bad the animal was destroyed.

Post-mortem Examination: The P.M. examination revealed complete fracture in two places. One oblique in direction, commencing below the medial tuberosity running obliquely towards and ending along the musculo-spiral groove. The other complete fracture involving the distal extremity of the humerus. The latter was roughly V shaped, the limbs of the V commencing from between the nutrient foramen and medial epicondyle on one side, and from the lateral condyloid crest on the other, both arms of the V meeting in the coronoid fossa.

Diagnosis: There was no previous history of any injury to this part of the limb and as there was no question of the horse having fallen at the time of the accident the fracture of the humerus was attributed to violent muscular pull.

Since the displacement of the fractured parts of the bone was towards the outside (opening out) the writer thinks that the traction of the following major muscles of the arm was responsible for the fracture.

(1) Supra spinatus muscle, and (2) Infra spinatus muscle.—Both pulling the proximal end of the humerus upwards.

(3) Deltoideous muscle.—Pulling the humerus outwards.

(4) Extensor Carpi radialis and other extensors.—Pulling the distal end of the humerus downwards.

(5) Biceps brachii muscle.—Fixing the shoulder and elbow, thus exposing it to fracture.

Review

Farming and Gardening for Health or Disease. By Sir Albert Howard. Faber & Faber, 24, Russell Square, London, W.C.1. Price 12s. 6d. nett.

PRIMARILY all plants and animals depend for their existence upon the soil. Health, be it good or bad, is directly related to the quality and quantity of the food

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which is available and consumed. The quality and quantity of food depends upon the state of the soil in its fertility. Nature husbands her resources and her main source of wealth is in the soil and she so arranges the cycle of life that this soil is refreshed and replenished regularly by the products of decaying organic matter. This is the theme of the book. If we interfere with, or intercept nature's cycle, disaster threatens. The early nomadic pastoral people were interceptors; they simply garnered the fruits of the earth and took no part in their production. If this mode of life had remained unchanged it may be that the whole world would by now be in a state similar to that of Arabia and certain parts of Africa where the nomadic kind of life still persists. To grow crops meant settlement, and this was the birth of agriculture and good husbandry. In the first three chapters Sir Albert tells how this came about and gives most interesting details of the evolution of agriculture down the ages.

In Chapter IV he gives an account of how the fertility of the soil in Great Britain has been maintained since the Roman occupation, and in Chapter V how agriculture has been affected by industrialism and the profit motive.

Then comes the intrusion of science into what had been an imitation of nature. In 1840 Liebig, the pioneer in agricultural chemistry, caused a revolution in agriculture. He introduced the chemical fertiliser. There are those who count him to be the greatest benefactor; there are others—and Sir Albert would appear to be amongst their number—who would say that he was responsible for a change which at any rate went too far, and although highly fertile soils were stimulated further, the farmer began to live on his capital, the soil, and so waste his assets.

Part II, in Chapters VII—XI, deals with soil erosion, diseases of crops and animals and the influence of soil fertility on human health. These pages make most interesting reading. The author's views attract and command attention.

In Part III we come to Sir Albert's own particular theme. In it he discusses the problems of manuring, which, as he says, "is perhaps the most insistent of those problems which owe their origin to human action directed towards manipulating for the benefit of humanity the life of the vegetable and animal kingdoms." Sir Albert is all in favour of "muck" or organic manure, particularly by the "compost method." He gives details of the preparation of compost, and supports its claims by quoting experiences in many parts of the world and under various circumstances. Chapter XIV is devoted to the reception of the Indore (compost) process by the scientists and the clash of views between the "artificial manurers" and the organic or "muck" users.

Part IV is devoted first to Sir Albert's conclusions and suggestions, and also four most interesting contributed accounts of the successes which have followed the adoption of his methods in Bengal, Rhodesia, South Africa and in Wiltshire. The experiences of Friend Sykes at Chute, near Andover, will be of special interest to English readers.

Whether one agrees 100% with Sir Alfred or not there is one thing stands out, and that is he has made such a good case for his methods that they demand the attention of those in authority. Surely official trials and tests are required to settle once and for all these controversies between the "artificial" and non-artificial protagonists. If Sir Albert is right his methods should be broadcast far and wide for the benefit, not only of agriculture and the farmer, but also for the well-being of the human race.

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ABSTRACT

A STUDY OF BOVINE INFECTIOUS KERATITIS*

By EARL M. BALDWIN, JR., B.S., D.V.M., M.S.
Omaha, Nebraska.

KERATITIS in bovines is not unknown in Britain. Its true etiology is as yet unknown. It causes considerable loss. It is thought that the following abstract relating to a similar condition encountered in the U.S.A. will be of interest to workers in this country.—(Ed.)

Bovine infectious keratitis is a disease affecting cattle of all ages and breeds, characterised by an acute inflammation of the eyeball and its surrounding tissues. It is sometimes referred to as "pinkeye." Dairy cows affected with the disease may drop 25 per cent. or more in milk production and become unthrifty. Beef cattle, particularly young stock on which the owner is depending for a rapid gain in weight, may fail to gain, or even lose weight.

Specific ocular infections which resemble infectious keratitis clinically have been reported from Canada, the British Isles, Germany, France, South America, and South Africa.

The symptoms and lesions of infectious keratitis can best be described under two headings: acute ophthalmitis and ulcerative keratitis.

Acute Ophthalmitis.—Infection may occur in one or both eyes, separately or simultaneously.

The first symptoms usually observed are an acute conjunctivitis, blepharitis and a lacrimation so copious that the area below the eye is kept constantly wet. Flies are attracted in great numbers by this discharge. The iris partially or completely occludes the pupil and may appear to be distended forward. The distension is probably due to increased pressure in the posterior chamber and vitreous body. The iris may be obscured by the opaque cornea.

Varying degrees of corneal opacity appear on the second to the fourth day. The circumcorneal vessels will often start to encroach into the corneal tissues and impart a bright red periphery to the opaque cornea. Due to the increased intraocular pressure, the cornea will sometimes appear markedly distended, particularly when the symptoms are pronounced.

Close observation on the third or four day will usually reveal a very small, centrally located corneal ulcer. A small pimple-like protuberance sometimes precedes the ulceration. The depth of ulcers varies with the severity of the infection. If only the two outer cellular layers (epithelium and Bowman's membrane) are ulcerated, the cornea heals completely in one or two weeks. If the ulceration penetrates the substantia propria to any extent, the disease may progress to the chronic type. As the disease progresses, the discharge tends to become more mucoid.

Due to pain and photophobia, affected cattle stand in the shade with their eyes partially or completely closed and their heads lowered. Vision is impaired in degrees varying with the corneal opacity.

Chronic Ulcerative Keratitis.—A common sequel to acute ophthalmitis, especially when animals are not properly treated, is a chronic disease complicated by secondary pyogenic bacteria. The cornea becomes extensively and deeply ulcerated and thickened by an increase of interstitial tissue in the substantia propria. It becomes dull grey and a yellow, purulent, fibrinous deposit is often

* *American Journal of Veterinary Research*, July, 1945.

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evident in the ulcerated area. The circumcorneal vessels are visible in the cornea. The discharges become thicker and more purulent. Frequently, Descemet's membrane and its endothelium prolapse through the ulcerated substantia propria. If these membranes rupture, the infection readily enters the anterior chamber and produces a hypopyon.

Infectious keratitis is a seasonal disease occurring enzoötically during the summer and early autumn, but sporadic cases may occur throughout the year. It occurs in practically every part of the United States.

The morbidity in an affected herd varies considerably, with environmental conditions. Usually, from 50 to 60 per cent. of all animals in a herd become infected no matter what treatment or control measures are employed.

The most common source of original outbreaks is the introduction of infected cattle. Once established on a premise, the disease may occur every year and spread to other farms.

The incidence is higher in animals under two years of age than in older animals, particularly where the disease occurs every year.

The investigational findings here reported indicate that *Hæmophilus bovis* is the probable cause of infectious keratitis. *H. bovis* was found in 93 (83 per cent.) of 112 infected eyes examined. It was not found in either eye of 20 normal cattle. Cultures of *H. bovis*, when inoculated into the conjunctival sac, induced an infection indistinguishable from infectious keratitis in one or both eyes of 12 of 15 animals. *H. bovis* persisted in the eyes of the majority of the experimentally infected cattle for two or more months following inoculation, even though the cattle had apparently completely recovered from the infection.

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THE following have been awarded the Evans Veterinary Studentships for the best fourth-year student at each college, tenable for their fifth year:—

Royal Veterinary College, Streatley.—Mr. F. G. Startup.

School of Veterinary Science, University, Liverpool.—Mr. G. T. Wilkinson.

Veterinary College, Dublin.—Mr. J. T. Nicholson.

Veterinary College, Glasgow.—Mr. R. S. F. Campbell.

Royal (Dick) Veterinary College, Edinburgh.—Mr. J. B. Wilson.

APPOINTMENTS

Colonial Veterinary Service.—C. G. L. Beveridge, Veterinary Officer, Uganda.

Colonial Veterinary Service.—W. G. Emerson (Deputy Director of Veterinary Services, Kenya), Director of Veterinary Services, Kenya.

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